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ABSTRACT

The Applied Technology in Business program at Oakland University (Michigan) is a business minor that focuses on training business students in the proactive use of information technologies to solve business problems. The program is sponsored by corporations that provide real business problems for students to solve. Students learn problem solving, application development, project management, and information technology (IT) skills in the classroom and work in teams to solve the business problems. The four-semester program includes the following courses: Business/IT Foundations; IT Project Management; General IT Management; and the IT Internship. The objective of the program is to coordinate education, training, knowledge transfer, and research in the application of information technology to business using the coordinated efforts of faculty, students, and professionals from industry. This triadic relationship includes faculty/student, student/industry, and faculty/industry interaction. The partnership is operationalized using business application, skill training, knowledge management, and applied research frameworks. Figures contained in this paper include a diagram of the triadic partnership, a chart of IT use in support of business applications, a list of business and IT skills, business and IT skills ladders, and a description of student projects. (MES)

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Integrating Business and IT Education

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INTEGRATING BUSINESS AND IT EDUCATION

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INTRODUCTION

In today's changing business and IT world, it is critical that we educate students to be adaptive to the changes in the market place, use information technology effectively when appropriate, and work effectively as teams to solve business problems. Many models have been used in business and computer science schools to provide students with either the technology or application focus, and these are successful in building needed "mediation" skills - provide business student with some IS exposure/ understanding or CS student with business exposure/relevance.

However, as the growth in demand for the use of technology increases in the business arena, it is critical that non-technical users become more proactive in using IT and managing the development of IT projects. This would have required extensive training in the past when most of IT is main-frame based and application development is based on 3rd generation software. However, in today's PC/workstation environment and GUI-based application development, it is not inconceivable that many work-flow automation, data retrieval, web-based applications can be conceived, developed and managed by users that are technically inclined. This shifting of responsibility for some of the application development (ex: personal productivity type applications) to users, empowers them to use technology more proactively. It also relieves the IT units from the development of such business driven and highly volatile systems, so they can focus on enterprise-wide systems and act as an effective R&D for the firm by exploring the relevance of new and continually changing technologies.

With this in mind, the School of Business Administration at Oakland University has established a business minor in applied technology (called Applied Technology in Business) and it is available to all business students on a competitive basis.

This minor is different from a typical IS minor (or major) in the following way: an IS minor often is a collection of courses a business student takes from the IS department to get exposure to systems development activities, so they appreciate the complexities behind systems development/implementation effort. In other words, the focus of these IS minors is to make the business student see the world through the eyes of an IS professional. This is probably sufficient if a user is going to continue to rely on IS professionals to build systems. However, if we want to make users more proactive in the development and use of IT on their own, they need to see IT from a business professional's perspective: what are the business problems a firm is facing and how can IT play a role in solving these problems. Also, in order to gain confidence in their own capabilities and become proactive in the use of IT, they need to build application prototypes using IT and solve specific business problems. In other words, *they need to see IT from a business professional's perspective.*

The rest of this paper is organized as follows. Next section briefly describes the program and it current participants. Section three provides a broader program overview and discusses two specific sections that have a direct impact on the program curriculum.

APPLIED TECHNOLOGY IN BUSINESS (ATIB) PROGRAM

The *Applied Technology in Business* program is a unique business minor that focuses on training business students in the proactive use of information technologies to solve business problems. It has the following features:

- **Program is sponsored by corporations** - every student admitted into the program has a corporate sponsor, who makes a contribution to the program for two years

- **Sponsoring companies provide real business problems for the students to solve**, and these are

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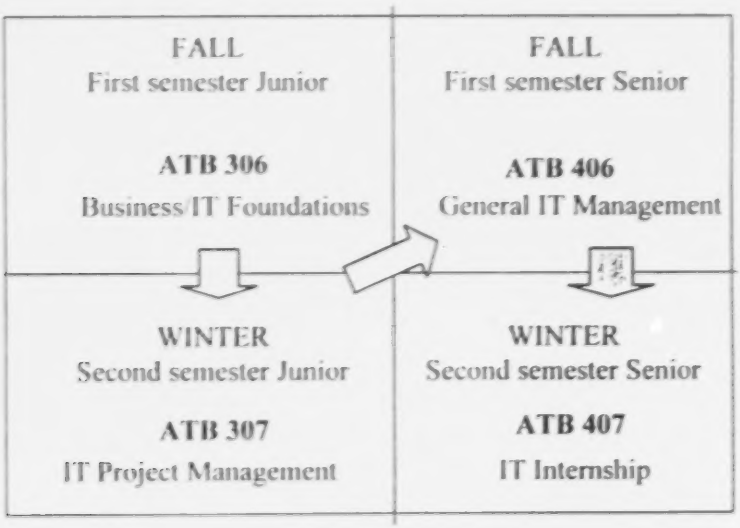
addressed in *three of the four courses* they take under this program

- **Students, drawn from all business majors**, learn problem solving, application development, project management and IT skills from the classroom, and apply these skills concurrently to solve business problems that are posed by the sponsoring firms
- **Students work in teams to solve business problems over a three semester time period**, so they learn the application of IT to a variety of business settings and manage the development of these applications projects
- **Students incorporate many of the business and IT professional skills within their project activities**. Some of these skills include:
- Making oral presentations,
- Preparing executive summaries and status reports,
- Working in teams, managing time and resolving conflicts,
- Tracking projects and allocating resource (time and human resource)
- Documenting and prototyping,
- Gathering data and analyzing it, and
- Learning to use help systems and other support environments in learning technology, etc.
- **Students admitted into the program are undergraduate juniors**
- **Students will have taken two IS courses**: PC Introduction and Introduction to MIS concepts
- **Students have four semesters to complete the program** and their last semester will be a half-time, in-residence internship at a corporate site, and
- **Students are to become educated in the broader management and use of information technology**

Course Structure

Four courses are established to support this program (ATB 306, ATB 307, ATB 406 and ATB 407).



The students enter the program during the first semester of their junior year and leave the program in the second semester of their senior year.

1997-1999 Corporate Sponsors

Champion Enterprises	Chrysler Corporation
Comerica	Compuware
Durakon Industries	Eaton Lectron Products
EDS (2 students)	Hubert Distributors
IBM	ITT Automotive
Kelly Services	Lear Corporation
Meritor Automotive	MSX International

Core Industries (now The United Dominian Industries)
School of Business Administration (2 students)

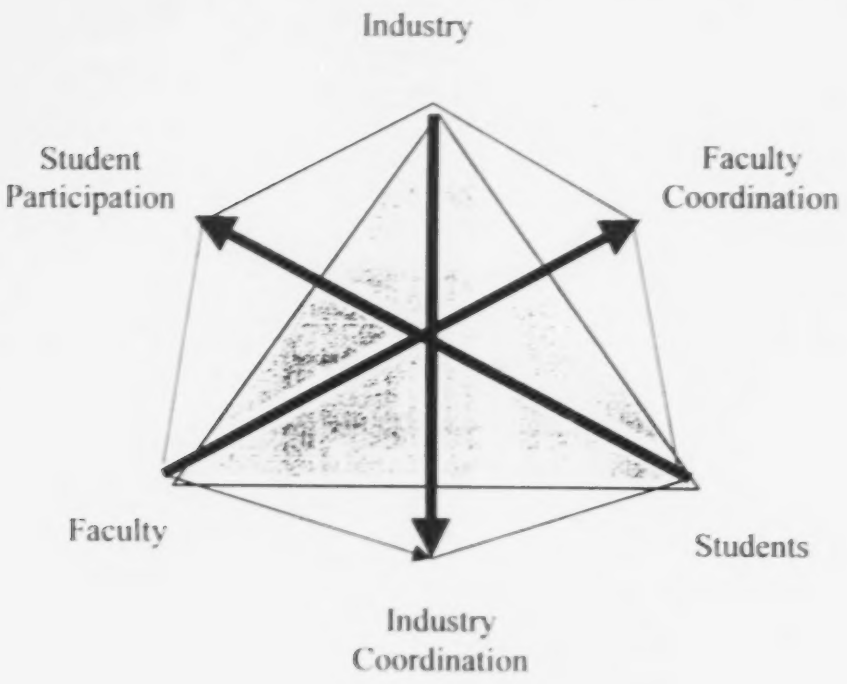
1998-2000 Corporate Sponsors

Champion Enterprises	Chrysler Corporation
Compuware	Eaton Products
EDS (2 students)	GMAC
ITT Automotive	Kmart
Lear Corporation	Meritor Automotive
National Tech Team	Providence Hospital
RGIS Inventory Specialists	St Joseph Mercy Hospital
St John's Health System	Volkswagen of America

PROGRAM FRAMEWORK

The objective of the Applied Technology in Business (ATiB) Program is to coordinate education, training, knowledge transfer and research in the *application of information technology to business* using the coordinated effort of three entities: *faculty, students and professionals from industry*. Refer to Figure 1. While this by itself is not new as many schools use internships and co-ops to support student-industry interaction, consulting to support industry-faculty interaction and traditional class-room teaching to support faculty student interaction, what makes this program unique is the active participation of the all three in each activity. This is elaborated below.

FIGURE 1
A TIRADIC PARTNERSHIP OF FACULTY, STUDENTS, AND INDUSTRY



The ***faculty<->student*** interaction in this *triadic relationship* uses a variety of pedagogical means to support the class room teaching and ***industry*** plays an active role in this process. They

- listen to student presentations at monthly workshops and provide feedback,
- provide and coordinate projects so the students can learn about the application of technology,
- grade some of these project outcomes and the associated project activities,
- come to the class room to discuss various issued industry is facing in the information technology arena, and
- participate in the yearly review of the program (curriculum, technology and research).

The ***student<-> industry*** interaction allows the firms to explore new technologies using bright and young minds in a relatively low-risk environment, while at the same time providing opportunities for the students to experience the complexity of problem solving in the real world. While this type of interaction in seen in many co-op and internship programs, this program differs from others in the following ways

- The project activity is modularized over three semesters, so that both business and IT skills are learnt incrementally. The ***faculty*** play an active role in this interaction by coordinating projects more directly in the early phases of the program and gradually letting the students manage them on their own towards the end.
- Even if a student is working on one project, because most of these are done in the early phases in the ATiB laboratory, they get to learn from other student projects and share what they learnt with others. The ***faculty*** play an important role in supporting this knowledge sharing.
- Each student works with as many as three to four companies on multiple projects with different students so they get a breadth of exposure to real-world problems and the associated IT-related challenges, and learn to work with a variety of students. Again, ***faculty*** play an important role in the project assignment and team-formation.

The ***industry<->faculty*** relationship allows for the continued faculty learning of the problems in the application of technology to business, so appropriate research ideas can be pursued. Again, while this in itself in not uncommon and many consulting activities of faculty support this type of exploration, what makes this program unique is the role ***students*** play in the initial research exploration. The diversity of projects students engage in allows the faculty to look at the exploration and use of technology first, and then look for methodologies and generalizations based on this experience. Also, given that the projects are not limited to any particular area (address all aspects of value chain and all types of technologies), the research endeavors allow the participation of faculty from multiple disciplines and multiple universities.

This partnership is operationalized using four basic frameworks

Business Application Framework
Skill Training Framework
Knowledge Management Framework
Applied Research Framework

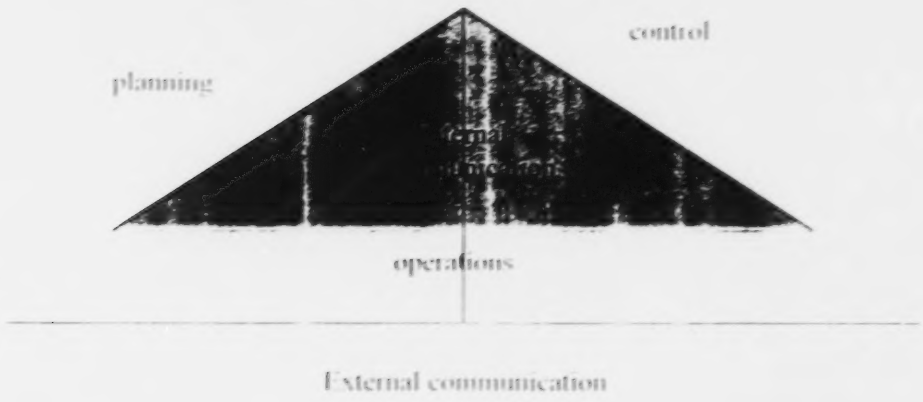
In this section, we will discuss the business application and skill training frameworks, as these are critical for the curriculum development of the ATiB program.

Business Application Framework

Given that use and/or exploration of information technologies by different organizations at any given time is to support some aspects of business operations or decisions, we wanted to use a generic framework to map the corporate projects that are undertaken under this program. This not only makes the teaching of concepts easier, but it also helps us look for similarities among various projects, generate methodologies that are applicable across applications, and store and reuse knowledge acquired.

The framework we chose is shown in Figure 2. The operations activity is studied further in depth by mapping it to various primary value chain activities (Porter). The control and planning activities are expanded to accommodate the multiple levels of decision making (operational to strategic), and the communication is looked at from internal and external perspectives.

FIGURE 2
BUSINESS APPLICATION FRAMEWORK



Each of the projects is mapped to operations, control, planning and communication (internal and external) activities of a firm. An incremental and evolutionary approach is used to discuss the applications. Study the simple and baseline applications first and build on these to more interesting and somewhat complex applications in each of the other two semesters. See Figure 3.

- First semester includes process analysis/design of business *operations*, simple data analysis for *control* and spreadsheet modeling for *planning*, and simple email/web based support for *communication*;
- Second semester includes inter-organizational linkage of business *operations*, advanced information retrieval for *control*, knowledge based and group decision support systems for *planning*, group-ware based interaction for *internal communication*, and web-based integration for *external communication*;
- Third semester includes network-related issues for integration of *operations*, environmental scanning for *control*, strategic uses of IT and resource allocation as part of *planning*, and intranet and Internet technologies for *internal and external communication*.

FIGURE 3
IT USE IN SUPPORT OF BUSINESS APPLICATIONS

	ATB 306	ATB 307	ATB 406
External Communication	Email and Internet/Web Use	Web/data base interfaces, Internet-based research	Networked and virtual organizations
Internal Communication	Email and Intranet use, document transfer, file attachments	Work-flow and document management	Knowledge management and reuse
Planning	Decision support for business functions, what-if analysis	Knowledge-based and group decision support	IS planning and resource allocation
Control	Reporting and querying of data from data bases	Data analysis, problem diagnosis, and environmental scanning	Executive support and competitive intelligence
Operations	Business process documentation and redesign	Process sequencing, costing, and use of IT for process improvement	Role of networks on inter-organizational operations

Skill Training Framework

A set of business and IT skills a business student needs to acquire are identified from prior research. In order to assess the relative importance of these skills for a business student, who is to become effective and proactive in the use IT to solve business problems, we surveyed several academic faculty and corporate sponsors of this program. These skills in the order of importance are shown in **Figure 5.** We recognize the need to revisit this set frequently if the program is to remain relevant over time.

In order to incorporate the training of business students in these skills over a three semester program, an **incremental approach** is used (see Figure 4).

1) *Introduce the students to high priority business and IT skills in the first term and add others incrementally.* **Figures 6 and 7** show the skill ladder for both business and IT skills.

2) *Integrate the learning of these skills into the classroom teaching (applications using the business framework discussed earlier) and projects provided by the sponsors.*

This is accomplished by having classroom work on building various IT applications (e.g. enterprise data modeling, group decision support system for budgeting, work-flow automation, e-commerce applications, knowledge based applications, etc.) completed in teams and presented (oral as well as written) to various corporate sponsors.

FIGURE 4
BUSINESS/SKILL INTEGRATION

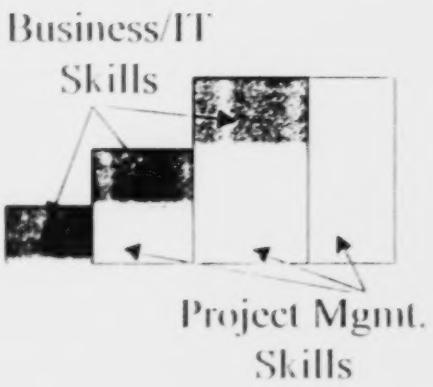


FIGURE 5
A LIST OF BUSINESS AND IT SKILLS

Skills Ranked 7-8 on a 1-10 scale (10 being the most important)
Business skills
Problem solving skills
Working in teams and supporting diverse views
Oral presentations of project proposals and summaries
IT skills
- Dos/Windows, Data bases, Spreadsheet, Internet/Web use, and Word processing

Skills ranked 6
Business skills
- Written communication skills
- Research skills
- Project management skills
- Conflict management
- Managing Team work

IT skills
- Generating reports
- Use of different software packages
- End-user application development
- Cost justification and System integration

Skills ranked 4-5
Business skills
- Interviewing
- Professional correspondence
- Meeting management
- Entrepreneurship
- Innovation
- Broader business issue understanding

IT skills
- Access to external data
- Some programming (e.g. Vbasic)
- Data analysis
- Use and evaluation of software packages
- Network management
- IT management - planning and implementation
- Ethics and security issues

FIGURE 6
BUSINESS SKILL LADDER

FIGURE 7
IT SKILL LADDER

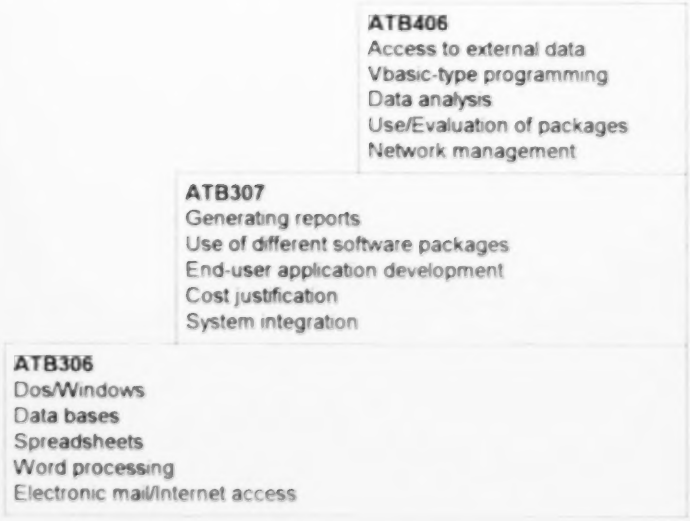


FIGURE 8
A DESCRIPTION OF PROJECTS COORDINATED IN WINTER 98

Project Number	Brief Description	Project Category	IT Category
1	Do market research for a technology-based employee placement firm	Business Analysis	- none -
2	Do an analysis of the current business processes used to support an external customer and propose a feasible IT based architecture	Process Analysis	disparate IT
3	Analyze current system and develop a streamlined approach to extracting pricing data	Systems Analysis	Lotus Excel
4	Analyze current work-flow model implemented in a groupware product and re-use this model for other applications	Systems A & D	Lotus Notes
5	Implement organizational policies/procedures system for use by multiple users	Design	Lotus Notes
6	Analyze current data gathering process used to allocate human resources and streamline it for greater efficiency and reporting	Analysis & Design	Access Web VBasic
7	Investigate ways to support user innovation by enabling them to seek the needed information	Business Analysis	- none -
8	Analyze current workstation monitoring system, used to identify application inventory, and redesigned it for improved access and querying flexibility	Systems A & D	LanDesk database
9	Validate a new system being designed to replace an existing sales, invoicing and operations system	System Validation	Contract Software
10	Investigate into the feasibility of developing a "Competitive Intelligence System"	Business Analysis	Internet
11	Investigate into the way one can support distributed learning using Internet/group-ware products	Systems Analysis	LOTUS Notes
12	Analyze systems used to support "business recovery" and Year 2000 validation	Systems Analysis	- none -
13	Investigate into the use "help system software" for tracking customer complaint processing	Analysis & Design	Help Systems
14	Develop an integrated web application that links corporate and departmental views (SBA and departments)	Analysis & Design	Web
15	Develop a system that supports analysis of human resource data, stored in a data warehouse	Analysis & Design	Access/ Vbasic
16	Migrate from a current system to a new system to better support query and report generation	A, D, and Implement	Access

3) *Use corporate projects to support incremental learning of many project management and problem solving skills. A sample of our first term projects (winter 1998) are shown in Figure 8.*

- The first semester is spent in learning problem solving skills, engaging in team-work, etc. using class projects, without direct industry interaction. *Percentage of coursework allocated to corporate projects = 0%*

- The second semester is spent in solving real industry problems using a campus laboratory under closer supervision of the ATiB staff. *Percentage of coursework allocated to corporate projects = 40%*

- The third semester is spent solving business problems with less direct supervision and greater mix of lab and company facilities. *Percentage of coursework allocated to corporate projects = 70%*

- The last semester is spent doing all the work at the company site as a half-time resident intern. *Percentage of coursework allocated to corporate projects = 100%*

4) *Integrate individual learning of a student team from these projects with the learning of all others and support diverse exposure to problems/projects that address multiple facets of a business.*

Each student team of two students is assigned to two different company projects each semester. This exposes the students to a minimum of five different company projects during the program. To facilitate sharing of individual project knowledge with all others, the students use the lab environment to complete projects for two terms, thus allowing broader exposure, present their work periodically to the entire class for feedback and evaluation.

5) *Relate the project work to business application framework.*

Each of these projects are mapped to applications in operations, control, monitoring, and communication and the project summaries are stored under these categories for future use.

CONCLUSIONS

In this paper, we discussed a framework that is being developed to train business students in the proactive use and management of information technology and discusses how this activity is supported through projects provided by several corporations. This program is relatively new (one year old) and will undergo several revisions and refinements before it can be considered a success or used as a template for other schools to follow, if appropriate. However, our intent at this time is let people know about the program so we can get constructive feedback from our sponsors, potential sponsors, faculty from various schools, etc. and of course from students, who are primarily the recipients of such a program. Hope to keep you informed of our progress and you can continue to monitor our activities via our web page: www.sba.oakland.edu/atib/.